

As the large and conspicuous dragon-flies belonging to the genus *Uropetala* appear to be common in many parts of New Zealand, it should not be a difficult matter to work out the distribution of the two species if collectors will send along specimens from new localities for determination. As long as there was supposed to be only one species present there was no inducement to do this. So far as known at present, *U. carovei* occurs over the whole of the North Island, and also in the Lake Wakatipu district of the South Island, while *U. chiltoni* occupies a middle position at Arthur's Pass and Cass. This suggests that *U. chiltoni* may possibly be the species that inhabits the west coast of the South Island, and that it may be encroaching upon the domain of the eastern species through the gap at Arthur's Pass. It would otherwise be difficult to explain the presence of the species typical of the North Island in a locality such as Lake Wakatipu. It is, in any case, clear that, as regards the genus *Uropetala*, each Island does not possess its own peculiar species, but that some other barrier than Cook Strait has operated to bring about the differences existing at present.

ART. XXXV.—*Studies of New Zealand Trichoptera, or Caddis-flies: No. 1, Description of a New Genus and Species belonging to the Family Sericostomatidae.*

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INTRODUCTION.

AT the present twenty-six species of caddis-flies are known from New Zealand, distributed between fifteen genera, belonging to six families—viz., Rhyacophilidae, Hydroptilidae, Polycentropidae, Hydropsychidae, Leptoceridae, and Sericostomatidae. The first five of these families belong to the more primitive suborder Aequipalpia, in which the maxillary palps of both sexes are five-jointed; the Sericostomatidae, on the other hand, belong to the suborder Inaequipalpia, in which the maxillary palps of the male are reduced to four or three joints.

The suborder Inaequipalpia contains only three families out of the dozen now recognized as valid by students of this Order. Of these, the Phryganeidae can be recognized readily enough by the presence of ocelli, and by the males having the maxillary palps four-jointed. No representatives of this family have so far been discovered in Australia or New Zealand; they are also absent from Africa. The Limnephilidae, which are the dominant family of caddis-flies in most parts of the world, are distinguished

from the Phryganeidae by the males having the maxillary palpi only three-jointed, with the joints of normal cylindrical form, and never carrying specialized hairs or scales upon them. These also have not yet been found either in Australia, New Zealand, or Africa.

The family Sericostomatidae contains all those caddis-flies in which the maxillary palps of the male are reduced to three, or sometimes even to two joints, and are specialized by being of abnormal form and position, and carrying either long, thick hairs or sometimes even scales. They differ, too, from the Limnephilidae in having the ocelli nearly always absent.

The Sericostomatidae are the dominant family of caddis-flies in the fast-running rivers and mountain-streams of New Zealand. Our known species are placed in no less than seven genera, of which five are peculiar to New Zealand, one being found also in Australia, and one (*Helicopsyche*) found everywhere except in Africa.

In their life-histories the Phryganeidae and Limnephilidae differ from the Sericostomatidae both in the general habitat of the larva and in the form of its case. In the two first-named families the larva usually inhabits still or slowly moving water, and the case is formed of vegetable matter. A number of Limnephilidae, however, make use of other materials, such as shells of small mollusca, sand, &c. These cases are always portable. In the Sericostomatidae it is the exception for vegetable matter to be used in forming the case, and the larvae mostly inhabit running water. Most of the cases are formed of sand, or of a stiff, semitransparent chitinous material secreted by the larva. Occasionally small stones or pebbles are used, and much more rarely small pieces of twigs. The larvae are usually gregarious, and can be found in large numbers attached to rocks, stones, or sunken logs.

The classification of the family Sericostomatidae is a most difficult matter, and remains in a very unsatisfactory state, in spite of the excellent work of Ulmer. A large number of genera, including those found in New Zealand, are not placed in any definite subfamily or tribe, but are treated as a kind of appendix to the family proper. Amongst these one may easily single out the two New Zealand genera *Oeconesus* and *Pseudoeconesus* by their general superficial likeness to Limnephilidae. They have the broad, well-rounded wings usually found in this latter family; whereas most of the Sericostomatidae have the wings more narrowed or pointed. In life, too, they resemble Limnephilidae fairly closely. The larvae form cylindrical cases of small stones or pebbles, and these are usually found either singly, or two or three together, attached to rocks in swiftly running streams. They are very difficult to rear, as the larvae die very quickly when removed from the water.

In Mr. G. V. Hudson's collection at Karori, Wellington, there is a pair of very large caddis-flies evidently closely allied to the *Oeconesus* group. In size these are much larger than any other caddis-flies known in New Zealand, the male being $1\frac{1}{2}$ in. in expanse, the female nearly 2 in. They were taken in the Routeburn Valley, above Lake Wakatipu. Mr. Hudson very kindly allowed me to study these insects in December, 1919, when I happened to be in Wellington, and I desire to thank him for giving me the opportunity. The present paper is the outcome of that work, written in the light of considerable further study of this difficult family.

While on a visit to Cass, in January, 1920, I found a number of very large cylindrical cases made of small pieces of beech-twigs arranged

transversely. Later on I joined Mr. George Howes at Arthur's Pass, and we found the same cases in the streams around that locality. Those at Cass were all empty; but Mr. Howes was most fortunate in finding one at Arthur's Pass containing a pupa, which emerged soon afterwards. The insect proved to be the same species as that which I had been studying in Mr. Hudson's collection. These facts are given as a guide to any collector who might desire to obtain this insect by rearing it.

The full description of the imago is as follows:—

Family SERICOSTOMATIDAE.

Genus ZELANDOPSYCHE nov. gen.

Allied to *Oeconesus* McL., and to *Pseudoeconesus* McL., but more especially to the latter, the forewings having neither a costal fold nor a well-defined groove. Spurs 2, 4, 4; the two sets on the middle and hind tibiae close together. In the male the maxillary palps (fig. 2) are three-jointed and raised upwards, so as to lie close against the face; the first two joints are very short, cylindrical, the third very long, its basal two-thirds being fusiform, its apical third much narrower and cylindrical; the swollen basal portion carries some long soft hairs, the apical portion more numerous but much shorter ones. Antennae slightly longer than forewing in male, the basal joint thickened, as long as the next three taken together.

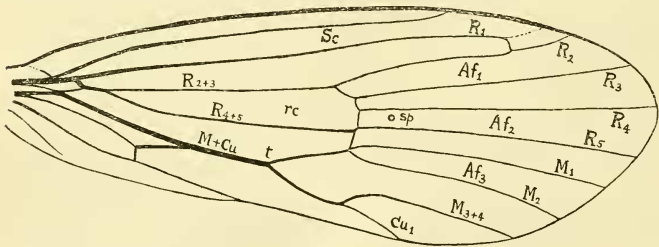


FIG. 1.—*Zelandopsyche ingens* n. g. et sp., ♂. Venation of forewing: Af₁, Af₂, Af₃, the first three apical forks respectively; Cu₁, first cubitus; M₁, M₂, M₃₊₄, the three branches of the media respectively; M + Cu, fused stems of media and cubitus; R₁ to R₅, the five branches of the radius; rc, radial or discoidal cell; Sc, subcosta; sp, wing-spot; t, thyridium.

Wing-venation differing considerably in the two sexes. In the female the venation is fairly normal; but R₁ ends up on R₂ instead of on the wing-margin, and the fork of Cu₁ is abnormal, in so far as Cu_{1b} is in the form of a cross-vein, and fuses with Cu₂ not far from its apex. The discoidal or radial cell is closed, the median cell open. From the thyridium (fig. 1, t), M₃₊₄ runs obliquely downwards in a straight line to connect with Cu₁ by a very short cross-vein at the point of origin of Cu_{1b}, which continues this line downwards with a backward bend. Near the base, M, Cu, and 1A are all fused together; 2A and 3A junction with 1A after it has left M and Cu, which continue fused for a farther short distance. In

the forewing of the male the venation is similar to that of the female from the costa down to M_2 , except that the discoidal cell is much larger, Rs bifurcating very close to the base. Below this there is an area of high specialization, in which the thyridium and that portion of the main stem of M lying basad to it appear to have become completely fused with Cu_1 , and also with Cu_2 . M_{3+4} is unbranched, and leaves the cubitus distally in such a manner as to suggest a normal cubital fork. The anal venation is also abnormal, and cannot be interpreted with certainty. The hindwings of both sexes are closely similar, with fairly normal venation; the discoidal cell is closed, the median cell open, and apical forks 1, 2, 3, and 5 all present.

Genotype: *Zelandopsyche ingens* n. sp.

This genus differs from *Pseudoeconesus* and *Oeconesus* in the much larger size and the form of the maxillary palpi of the male; in the two genera mentioned the third joint is much swollen and of an oval shape. It also differs from both genera in the peculiar specialization mentioned in the male venation in the region of the thyridium of the forewing. It differs further from *Pseudoeconesus* in having R_{2+3} , forming the anterior border of the discoidal cell, straight, and from *Oeconesus* in lacking the costal fold and definite groove in the forewing.

The three genera *Oeconesus*, *Pseudoeconesus*, and *Zelandopsyche* appear to me to be so distinct from the rest of the family that they might legitimately be placed together in a single tribe *Oeconesini*, distinguished by their broadly rounded forewings and general superficially *Limnephilid* appearance. Representatives of this tribe occur very rarely also in Australia and Tasmania, but have not yet been described.

Zelandopsyche ingens n. sp. (Figs. 1-3.)

♂. Total length, 12.7 mm.; abdomen, 8.2 mm.; forewing, 19 mm.; hindwing, 16 mm.; expanse of wings, 38.5 mm.; antennae, 21.5 mm.

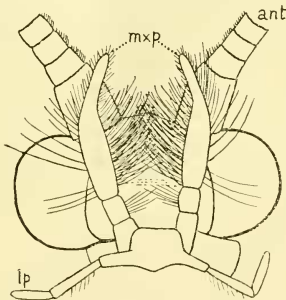


FIG. 2.—*Zelandopsyche ingens* n. g. et sp., ♂. Head viewed antero-ventrally, to show bases of antennae (*ant.*), maxillary palpi (*mxp.*), and labial palpi (*lp.*).

Head rich brown; eyes black; antennae brown, the articulations of the joints beyond the scape only faintly indicated. Maxillary palps as described or the genus, dark brown. Labial palps pale brown, slender, the basal

joint shortest, the second and third about equal; viewed from below, the second joint is ridged along both edges, and carries short hairs. Fig. 2 shows the two pairs of palps and the base of the antennae *in situ*, as seen somewhat ventrally from in front.

Thorax dark brown; prothorax very short, mesothorax large and stoutly built, metathorax rather short. Legs pale brown, very long, the length of the hindleg when extended being about 21 mm.; the tibial spurs as in the generic definition. Forewings dull fuscous-brown, costal margin paler brown; hairs very short, the venation clearly visible; apical half of wing irrorated irregularly with small paler-brown areas, especially along the anastomosis and for 3 mm. to 4 mm. inside the apical margin. Hindwings of a paler brown, costal margin and distal end of Sc yellowish-brown; hairs exceedingly short, except at base of anal veins and along anal border, where very long pale-yellowish hairs are abundant. Venation as given in the generic definition; that of forewing of male is shown in fig. 1.

Abdomen dull greyish-brown, the first segment slightly paler. Appendages rich brown, shaped as shown in fig. 3.

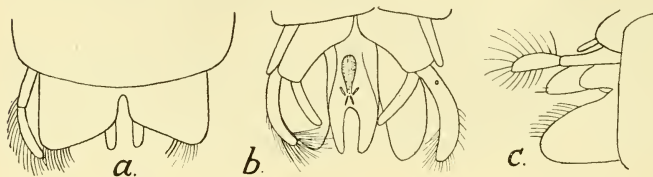


FIG. 3.—*Zelandopsyche ingens* n. g. et sp., ♂ Anal appendages viewed from three directions: *a*, dorsally and slightly from the left; *b*, ventrally and slightly from the left; *c*, laterally.

Female very similar to male, but larger. Forewings paler, with a large subquadrangular blotch of pale yellowish-brown between Cu and 1A about two-fifths from base; the paler irrorations are more definite, and tend to become arranged in transverse rows across the distal half of the wing. Maxillary palps with joints 1-2 short, 3-5 long and about equal. Abdomen stouter and longer than in male, the terminal portion (somewhat shrivelled) apparently carrying downward lateral flaps on segments 8-9.

Types.—Holotype, ♂, and allotype, ♀, in Mr. G. V. Hudson's collection.

Habitat.—Taken amongst stones at the water's edge, Routeburn Valley, near Lake Wakatipu.